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## WHAT IS CLAIMED IS:

1. A method for refining an approximate device location in a computer system comprising:

determining an approximate location of a device;

5 reading a rule base that comprises an ordered collection of rules; capturing an imprecise input;

processing the imprecise input to determine a magnitude of participation of the input in the rules;

applying the rules to the imprecise input based on the magnitude of participation

to produce a logical product; and

computing a refined location based on the logical product.

- 2. The method of claim 1 further comprising:
  gathering empirical data; and
  progressively refining the rule base based on the empirical data.
- 3. The method of claim 1 wherein the rule base provides a default rule.
- 4. The method of claim 1 wherein the rule base is configured to reflect20 regional trends, social trends, or demographic trends.
  - 5. The method of claim 1 wherein one of the rules utilizes a logical product in an antecedent to determine a consequent.

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- 6. The method of claim 1 wherein the imprecise input is locational.
- 7. The method of claim 1 wherein the imprecise input is activity profile5 based.
  - 8. The method of claim 1 wherein the imprecise input is temporal.
  - 9. The method of claim 1 wherein the imprecise input is spatio-temporal.
  - 10. The method of claim 1 wherein the magnitude of participation is within an interval [0,1].
- The method of claim 1 wherein a three-valued set is defined for each
   imprecise input, wherein the three-valued set comprises a truth value, a false value, and
   an uncertainty value.
  - 12. The method of claim 1 wherein the logical product of each rule comprises a value between 0 and 1.
    - 13. The method of claim 1 wherein the refined location is computed by: selecting the rule with the highest logical product; and using a consequent corresponding to the selected logical product as the refined

location.

14. The method of claim 1 wherein the refined location comprises a list of candidate locations.

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- 15. An apparatus for refining an approximate device location in a computer system comprising:
  - (a) a computer having a memory;
- (b) an application executing on the computer, wherein the application is
   10 configured to determine an approximate location of a device;
  - (c) an inference engine executing on the computer, wherein the inference engine is configured to:
    - (i) read a rule base that comprises an ordered collection of rules;
    - (ii) capture an imprecise input;
- 15 (iii) process membership functions stored in the memory of the computer, wherein the membership functions define a magnitude of participation of the input in the rules;
  - (iv) apply the rules to the imprecise input based on the magnitude of participation to produce a logical product; and
    - (v) compute a refined location based on the logical product.
  - 16. The apparatus of claim 15 wherein the application is further configured to:

## gather empirical data; and

progressively refine the rule base based on the empirical data.

17. The apparatus of claim 15 wherein the rule base provides a default rule.

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- 18. The apparatus of claim 15 wherein the rule base is configured to reflect regional trends, social trends, or demographic trends.
- 19. The apparatus of claim 15 wherein one of the rules utilizes a logical10 product in an antecedent to determine a consequent.
  - 20. The apparatus of claim 15 wherein the imprecise input is locational.
- The apparatus of claim 15 wherein the imprecise input is activity profile based.
  - 22. The apparatus of claim 15 wherein the imprecise input is temporal.
- The apparatus of claim 15 wherein the imprecise input is spatio-temporal.
  - 24. The apparatus of claim 15 wherein the magnitude of participation is within an interval [0,1].

25. The apparatus of claim 15 wherein a membership function defines a three-valued set for each imprecise input, wherein the three-valued set comprises a truth value, a false value, and an uncertainty value.

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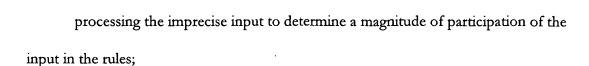
- 26. The apparatus of claim 15 wherein the logical product of each rule comprises a value between 0 and 1.
- The apparatus of claim 15 wherein the inference engine is configured to compute a refined location by:

selecting the rule with the highest logical product; and using a consequent corresponding to the selected logical product as the refined location.

- The apparatus of claim 15 wherein the refined location comprises a list of candidate locations.
  - 29. An article of manufacture embodying logic that causes a computerimplemented system to refine an approximate device location, wherein the logic comprises:

determining an approximate location of a device; reading a rule base that comprises an ordered collection of rules; capturing an imprecise input;

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applying the rules to the imprecise input based on the magnitude of participation to produce a logical product; and

- 5 computing a refined location based on the logical product.
  - 30. The article of manufacture of claim 29, wherein the logic further comprises:

gathering empirical data; and

progressively refining the rule base based on the empirical data.

- 31. The article of manufacture of claim 29 wherein the rule base provides a default rule.
- 15 32. The article of manufacture of claim 29 wherein the rule base is configured to reflect regional trends, social trends, or demographic trends.
  - 33. The article of manufacture of claim 29 wherein one of the rules utilizes a logical product in an antecedent to determine a consequent.
  - 34. The article of manufacture of claim 29 wherein the imprecise input is locational.

- 35. The article of manufacture of claim 29 wherein the imprecise input is activity profile based.
- 36. The article of manufacture of claim 29 wherein the imprecise input istemporal.
  - 37. The article of manufacture of claim 29 wherein the imprecise input is spatio-temporal.
- 10 38. The article of manufacture of claim 29 wherein the magnitude of participation is within an interval [0,1].
- 39. The article of manufacture of claim 29 wherein the logic defines a three-valued set for each imprecise input, wherein the three-valued set comprises a truth value,
   a false value, and an uncertainty value.
  - 40. The article of manufacture of claim 29 wherein the logical product of each rule comprises a value between 0 and 1.
- 20 41. The article of manufacture of claim 29 wherein the logic computes the refined location by:

selecting the rule with the highest logical product; and using a consequent corresponding to the selected logical product as the refined

location.

42. The article of manufacture of claim 29 wherein the refined location comprises a list of candidate locations.